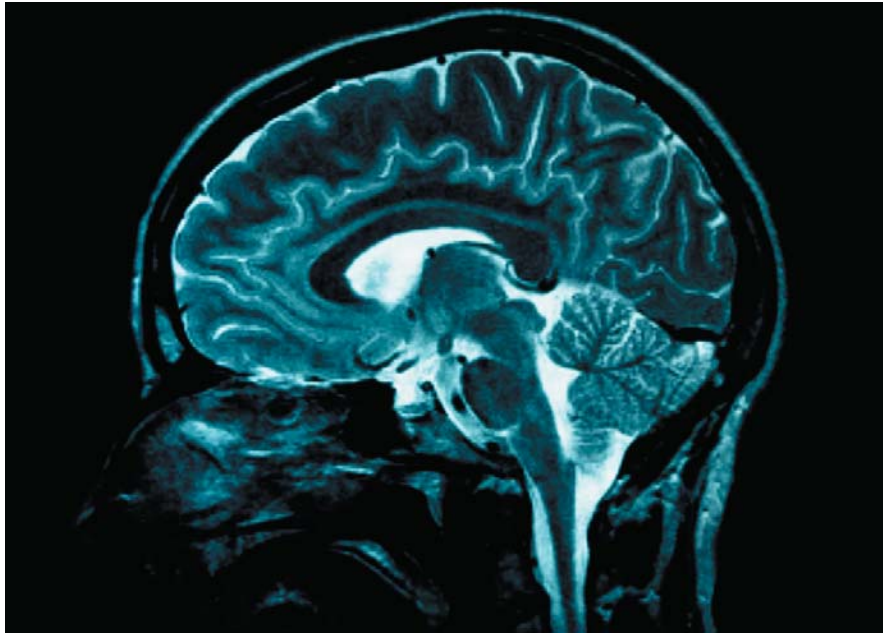

Stroke Update

By Kenny Navarro, LP



Introduction

Stroke is a nonspecific term that has come to mean a sudden interruption of blood flow to a portion of the brain with a resulting loss of neurological function. On average, someone in the United States suffers a stroke every 45 seconds and stroke is the third leading cause of death in this country ranking behind heart disease and cancer.¹

In 1995, the National Institute of Neurological Disorders and Stroke study group reported that early administration of new “clot-busting drugs” could reverse the symptoms in some patients who had suffered an ischemic stroke.² It did not take long for the Food and Drug Administration to approve this new drug. Today, many medical professionals who once considered a stroke to be a debilitating event now recognize that stroke victims can have a complete recovery if detected and treated early.

EMS personnel play a pivotal role in the initial evaluation and treatment of stroke and must understand its pathophysiology, clinical presentation and current treatment strategies.

Pathophysiology

Two major types of stroke exist based on the etiology: hemorrhagic or ischemic. The ischemic group accounts for about 88 percent of all strokes in this country.¹ Ischemic strokes are most often caused by blood clots from one of two sources.

Emboli are clots that form in the body and are carried to the brain by the bloodstream.³ A thrombus is a clot that develops within an artery that serves the brain.⁴ In either case, the clot blocks blood flow to a portion of the brain.

Within seconds to minutes of the loss of perfusion, a series of events begin that can ultimately lead to an area of irreversible brain tissue death. Surrounding this dead tissue is a zone of salvageable ischemic tissue that EMS can influence by helping to provide proper treatment.

Time seems to be a critical factor in reversing the ischemic cascade that ultimately kills the zone. Initial animal and human studies have shown that restoring blood flow using clot-busters within three hours provides the greatest opportunity for a complete recovery.

Because the window of opportunity

is so short for reversing the signs and symptoms, any delay in recognizing and treating the stroke must be minimized. The American Heart Association has developed the “Seven D’s of Stroke Survival and Recovery” as a memory aid for healthcare providers.⁵ EMS personnel must be keenly aware of the role they play within this Stroke Chain of Survival.

Stroke Chain of Survival

The first link in the chain is **detection**. The window of opportunity to reverse the neurological deficits begins as soon as the stroke occurs. Early treatment depends on the patient, bystanders or family members being familiar with the signs and symptoms of stroke. Unfortunately, the American Heart Association estimates that fewer than one out of ten patients was informed about the warning signs before they suffered their event.⁶

Unlike a heart attack, stroke rarely produces any pain. Almost all patients however, will experience some type of neurological impairment. Mild signs and symptoms include facial weakness, difficulty speaking or slight dizziness. Presentations that are more dramatic include paralysis on one side of the body or unconsciousness.

Mild symptoms may go unnoticed or be ignored altogether. Many times, the stroke occurs during sleep. Since there is no pain, the signs and symptoms are not discovered until the patient wakes. Still in other cases, the stroke may leave the victim too incapacitated to call for help.

Once the stroke is recognized, the **dispatch** link in the chain begins with activation of the EMS system. Patients arrive at the hospital by ambulance only about half of the time⁷ even though ambulance transport offers the safest mode of transport for stroke victims. Many stroke victims contact their primary care doctor before contacting EMS or allow family members to drive them to the hospital. Both of these actions delay arrival at the

hospital when compared to ambulance transport.⁷

EMS dispatchers have played critical roles in reducing the amount of time it takes for stroke victims to arrive at the hospital. Trained dispatchers recognize the potential for stroke when they receive a call for help and can assign a high priority to the call, which can minimize the amount of time it takes for a properly equipped rescue team to arrive at the patient’s side. Appropriately trained dispatchers can also assist bystanders or family members with pre-arrival instructions to minimize deterioration until the EMS personnel arrive.

The third “D” in the stroke Chain of Survival represents the **delivery** of the patient to the hospital. Historically, initial training programs devoted little time to the subject of stroke, considering it a form of altered mental status. Prehospital treatment protocols attempted to identify correctable causes of mental status problem. Finally, when the exam suggested a stroke, little emphasis was placed on rapid transport.

Now that a wider variety of treatment options are available, including for the first time the ability to completely reverse the stroke, EMS systems are beginning to organize their approach to stroke care like never before. The goals during the pre-hospital time period are to identify those patients who are potentially suffering from a stroke, provide supportive care for life-threatening symptoms and rapidly transport those victims to a medical facility which is properly prepared to care for this patient.

Stroke Evaluation

Identifying the potential stroke victim has gotten easier with the introduction of the highly accurate Cincinnati Prehospital Stroke Scale.⁸

The Cincinnati Prehospital Stroke Scale evaluates three physical findings to predict the likelihood of stroke: facial droop, arm drift and abnormal speech. EMS personnel begin by asking the patient to smile or

show their teeth. A normal facial droop test reveals equal movement on both sides of the patient's face. If one side of the face does not move as well as the other side, an abnormal test exists.

To evaluate for arm drift, have the patient close his or her eyes and support the patient's arms as he or she holds them straight out, palms down. Tell the patient you are going to let the arms go and to hold their arms still. Under normal circumstances, both arms move equally down or remain straight when you let go. If the patient has had a stroke, one of the arms will drift downward while the other does not.

The final step in the Cincinnati Prehospital Stroke Scale is the abnormal speech test. Ask the patient to repeat a simple phrase such as, "You can't teach an old dog new tricks." If the patient has had a stroke, the patient will not be able to speak, uses incorrect words, or will have slurred speech.

If the evaluation suggests the likelihood of stroke, EMS personnel must work to quickly move the patient to an appropriate facility. The greatest chances of reversing the debilitating effects of the stroke come from transporting the patient to a specialized center within a few hours of the symptom onset. However, even when the window of opportunity has passed, stroke patients usually have better outcomes when treated at a facility that provides specialized stroke services.

Field Management of Stroke

Prehospital management should focus on support of airway, breathing and circulation along with rapid transport to an appropriate facility. If the exam suggests cervical trauma in addition to a stroke, implement spinal movement precautions early.

The stroke may result in paralysis of the muscles of the mouth and throat. This could represent a threat to the patient's airway by interfering with the swallowing

process and allowing saliva to pool in the back of the throat. Frequent suctioning and positioning the patient to allow for drainage of secretions might help protect the airway.

The use of an oropharyngeal or a nasopharyngeal airway can provide further airway support. If basic airway management is ineffective, endotracheal intubation may be considered. This is especially true for comatose patients. The American Heart Association now considers supra-glottic airways to be suitable alternatives to endotracheal tubes for some patients.⁹

Administer supplemental oxygen if the patient is hypoxic, but consider administration even if no evidence of hypoxia exists.⁹ Use a pulse oximeter to determine the effectiveness of your oxygen therapy.

Cardiac arrest in the stroke victim is relatively uncommon⁹ and usually only develops after respiratory arrest. However, cardiovascular abnormalities including arrhythmia and blood pressure disturbances are frequent and require close monitoring. Hypotension rarely develops and usually is a sign of something other than a stroke. The prehospital treatment of hypertension in the stroke patient is not usually recommended.⁹

Cardiac arrhythmia may point to the underlying cause or origin of the stroke. Atrial fibrillation suggests a cardiothrombic origin of stroke. Bradycardia suggests hypoxia or an elevation of intracranial pressure. Life-threatening arrhythmia is rare in ischemic stroke, but may occur in about 20 percent of hemorrhagic stroke.¹⁰ Other researchers have demonstrated a high incidence of arrhythmia within the first 48 hours of a hemorrhagic stroke.¹¹

Advanced personnel may establish IV access with normal saline at a keep open rate and perform a 12-lead ECG assessment; however, this action should not delay the transport of the patient.

Hypoglycemia can cause focal

neurological signs that very closely mimic those found in acute stroke. For that reason, every patient that presents with aphasia, hemiparesis or any other signs of stroke must have a fingerstick blood glucose evaluation performed. If hypoglycemia is present, treat with 50 percent dextrose and reassess the patient.

Do not administer 50 percent dextrose to stroke victims whose blood glucose values are normal or unknown. Animal and human studies have demonstrated a relationship between hyperglycemia and more severe brain injury in stroke.^{12,13}

Seizure is another condition whose signs and symptoms may closely mimic those of stroke. Post-ictal aphasia and paresis may last for several hours after grand mal activity. However, there are some clues that suggest seizure rather than stroke including lacerations on the side of the tongue or the lips and urinary or fecal incontinence. Stroke patients do have seizures, but they occur in only about 5 to 10 percent of ischemic strokes and are more frequent in hemorrhagic stroke.^{14,15}

EMS personnel must aggressively manage active seizures as they can potentially worsen the stroke. The EMS treatment of choice for seizure has traditionally been IV benzodiazepines, although intra-nasal administration with specially designed atomizers is becoming very popular. Regardless of the route used, monitor the patient's vital signs carefully for early signs of respiratory depression and hypoxia.

Hospital Care

Up to now, the first three steps in the Stroke Chain of Survival, **detection** or early recognition, **dispatch** of EMS, and **delivery** to a specialized stroke service facility have occurred. The final steps of the seven Ds in the stroke chain of survival now belong to the hospital.

The fourth D represents the **door**, or emergency department triage. The hospital must be ready to move very quickly to

organize the personnel and equipment necessary for the effective treatment of the stroke patient. The staff will have to gather **data**, the fifth step in the chain. A rapid physical exam must be performed and a thorough history gathered in order to identify those candidates who will likely benefit from the clot-busting drugs.

The patient will need to receive a CT scan very soon after arrival. The CT scan is the single most important diagnostic test for identifying acute ischemic stroke.

If the CT scan suggests the presence of an ischemic stroke, the medical staff along with the patient and the family must make a **decision** about the subsequent therapy, the next step in the chain of survival. The medical staff must carefully review the risks and benefits of the clot-busting drugs with the patient and the family. The original National Institute of Neurological Disorders study found a 30 percent increase in the chances that clot-busters will completely reverse the stroke, a 7 percent increase in the chance of a hemorrhagic stroke and about a 3 percent increase in the chance of death.² The patient will have to decide if he or she is willing to take those risks. If the decision is to proceed, the final step, receiving the **drug** will occur.

Conclusion

Stroke care has significantly improved the patient's chances of recovery over the last decade. For the first time, patients have hope of returning to a normal life following a stroke. However, the window of opportunity to help these patients is very short. If any link in the stroke chain of survival is weak, reversal of symptoms will not occur and the damage becomes permanent.

EMS plays a vital role in the chain of survival. Early detection of stroke along with rapid transport to a facility capable of reversing the debilitating effects of the stroke offers the greatest hope of a normal life.

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